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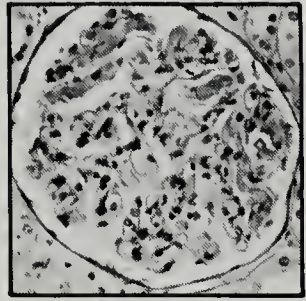
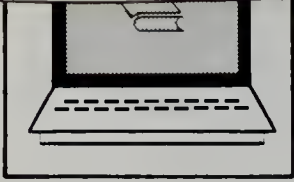
E C L I P S

Expandable Computerized Learning and Inquiry into Pathology

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Introduction

The Expandable Computerized Learning and Inquiry into Pathology System (ECLIPS) provides its users with a variety of different forms of information and with a means of communicating with authors and other users. ECLIPS provides textural, pictorial, and graphic information. In addition, ECLIPS provides bibliographic references and abstracts of selected current literature. It also suggests learning objectives. ECLIPS is specifically designed to support both sequential learning and specific problem-based inquiry, and to be useful to both medically naive and sophisticated users. It is now operational on both a 68010-based microcomputer (CADMUS 9000) and a VAX/780. A stand-alone single-user version for IBM and Apple equipment is under active development.

ECLIPS has two major components: the knowledge-base of pathology and the means of accessing the information in that knowledge-base, the Knowledge Access System (KAS). In addition to supporting ECLIPS, KAS and related programs also provide utilities for assisting authors in adding new information to the knowledge-base, for revising existing information, and for integrating new information into the knowledge-base.

What is the Knowledge-base?

A knowledge-base is a highly organized collection of information on a particular subject stored on a computer. Not simply a static collection of facts, the pathology knowledge base evolves by dynamically incorporating questions and comments along with newly-authored information and selected abstracts of the current literature. ECLIPS thus manages new ideas as well as it stores existing facts. Structurally, the knowledge-base can be thought of as a tree in which the “trunk” of the tree is the basic starting point from which radiate many information “branches” to explore. The Knowledge Access System (KAS) moves the user efficiently to the branch or leaf of the tree which contains the desired information.

In the knowledge-base, each branch and leaf of the tree is referred to as a “frame.” A leaf-frame provides textual information about a specific topic. It may have videodisc-based illustrations, references, and/or suggested learning objectives linked to it. A branch-frame provides access by means of a menu to a group of conceptually linked leaf-frames.

In addition to information displayed on the screen by user request, the knowledge-base also contains machine-interpretable knowledge about the information being displayed. This machine-interpretable knowledge is an alternative representation of the textual material; it is used by the machine to organize all other information in the knowledge-base and to help users find the information they want. This alternative representation includes descriptions of frame contents, pointers to other frames containing conceptually-related information, keywords, and bibliographic references.

What is The Knowledge Access System?

The Knowledge Access System (KAS) is a software package which finds information, manages the relationships among the various ideas within the knowledge-base, and expands the knowledge-base to include questions and comments. KAS also facilitates communication between users and content experts by automatically routing a copy of a user’s inquiry or comment about

a specific topic directly to the author of that section of the knowledge-base. In addition, KAS facilitates the way in which a user receives information to conform with the particular user's individual needs and preferences. KAS also contains the information needed in order to make optimal use of the capabilities of different types of terminals and video interfaces.

How does ECLIPS provide illustrations?

ECLIPS uses a conventional videodisc as its atlas. The prototype videodisc now being used contains two copies each of approximately 2500 illustrations, which occupy less than 10% of the space available on one side of the videodisc, i.e., 49,000 more illustrations can be added to the side of the disc now storing our pictures. An additional 54,000 can be stored on the other side. Industrial grade videodisc players retailing for about \$1000 can respond within three seconds to a computer's request to find and display any illustration. Existing capabilities allow a user to direct ECLIPS to display an illustration with a simple English language request. For example, ECLIPS will respond to the command, "show me small vessel angiitis," by displaying a series of photomicrographs illustrating this condition. We expect ECLIPS to be able to interpret more complex requests such as, "show me things that look like small vessel angiitis," within the next six months. We believe this ability will be very useful to practicing pathologists as well as medical students and residents.

In the present version of ECLIPS, the videodisc is a passive repository of pictorial information only. The computerized portion of the knowledge base contains all information for indexing illustrations, linking illustrations to text, displaying illustrations, superimposing graphics and/or text on the illustrations, and accepting and displaying comments about illustrations. As technology evolves over the next few years, some of this support information may also be stored on the videodisc.

How does ECLIPS out-perform a textbook?

In one sense, ECLIPS is a textbook. It contains information that knowledgeable pathologists have gleaned from the literature and from their own experience, adding their commentary and opinions, and have assembled into a logical sequence. This information may be read directly from a computer monitor or may be printed; ECLIPS interfaces with a variety of available printers. Beyond this, the resemblance to a textbook becomes strained. A textbook has only one sequence of information; ECLIPS has as many different sequences as its editors could devise and the ability to develop as many more sequences as its users may wish.

ECLIPS is also updated quite differently from the way in which a textbook is updated. When a textbook, even an expandable loose-leaf textbook is updated, every cross-reference to old material must be updated, including index, bibliography, and table of contents. The Knowledge Access System (KAS) that supports ECLIPS does all this automatically. Furthermore, when a person buys a new edition of a textbook (or an update of a loose-leaf text) he must buy many parts that have not changed along with the parts that have changed to avoid "cutting and pasting." In contrast, "cutting and pasting" are natural functions of computers; KAS adds automated "scissors and glue" to this process by its ability to cross-reference on the basis of an author's description of the added information.

What is the current status of ECLIPS?

ECLIPS is no longer a purely experimental system; it is now a working prototype. Not all of the features we plan for it are fully implemented as yet but the system as a whole is ready for field testing. A large part of our efforts over the next year will be devoted to analyzing responses of our intended audience to this prototype system and incorporating suggestions for improvement. We also plan to expand the knowledge-base both in depth and in scope. Other future plans for ECLIPS include providing for efficient communication with medical data bases such as AMA-NET and MEDLINE and applying techniques of artificial intelligence to help the system better “understand” what a user wants to learn or what an expert wants to clarify. Even when these plans are fully realized, however, we intend for ECLIPS to remain a problem-solving tool rather than a problem-solver or an automated consultant.

What hardware will ECLIPS need and at what cost?

The smallest computer needed to use ECLIPS comfortably in a stand-alone mode (i.e., independent of any larger machine except for obtaining updates of the knowledge-base and exchanging questions and comments) will be on a par with the IBM/XT® or Apple's MACINTOSH® series. Present prices of suitably-equipped machines start at about \$3,000. Alternatively, the system could be used in a hosted mode with almost any terminal or personal computer at a substantially lower initial cost but with the ongoing expense of telephone line charges.

Videodisc display requires a commercial-grade videodisc player which is capable of accepting computer output (current cost about \$1,000). We recommend using the system with an intermediate grade video monitor rather than a home television set for improved resolution (twelve or thirteen inch monitors, about \$700). For demonstration purposes, we are using an IEV-Model 60 interface system for overlaying text and computer graphics on the videodisc output. This interface overlays 80-characters-per-line text and/or high-resolution graphics on the video output without degrading the video signal at all and costs about \$1,500. We plan to explore the operating characteristics of less costly interfaces.

Presently, combining the costs of computer, videodisc player, monitor, and video interface, a work station capable of using ECLIPS in stand-alone mode can be purchased for approximately \$6,000. A work station designed to operate in hosted mode from a central system (local or remote) could start at approximately \$3,600. Machines capable of simultaneously supporting multiple users in a local cluster start at \$8,000.

Can I schedule a demonstration? Can I participate?

The working prototype of ECLIPS is currently available for demonstration purposes; we are very interested in getting feedback from individuals at all levels of training and expertise. If interested in seeing a demonstration or in becoming a contributor to the knowledge-base contact:

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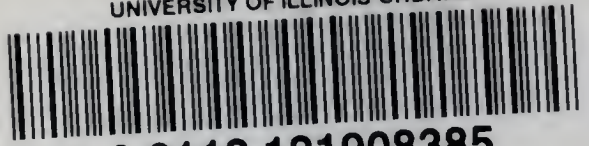
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